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Disaster Capacity Building in Climate Related Natural Disasters

Comparative Study of Post-Tsunami Indonesia and Sri Lanka

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Abstract

Disaster Capacity Building in Climate Related Natural Disasters:
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This thesis examines the various domestic capacity building initiatives as well as disaster management strategies of post-2004 Indonesia and Sri Lanka, the two most affected nations of the Indian Ocean tsunami. Despite similar levels of damage as well as progress of short-term recovery processes, these two countries in question have diverged in terms long-term disaster resilience building. Given this, this thesis investigates how the short-term and long-term resilience building process various depending on a government's capacity, focusing on the impacts of institutional coordination. Coordination ability of the government was assessed through the degree in which information sharing and agency collaboration were operative.

Analysis revealed that while insufficient government capacity can be compensated through international aid efforts, government capacity to appropriately coordinate disaster resilience building strategies is essential in long-term development plans. Sri Lanka and Indonesia had contrasting levels of progress in long-term resilience building strategies. While Indonesia took the approach of slowly fusing disaster management initiatives into existing national development plans, Sri Lanka's lack of institutional arrangement as well as funds for economic and urban planning measures hindered the country from doing so. As a result, Sri Lanka showed less progress in comparison to Indonesia.

Keywords: natural disasters, capacity building, 2004 tsunami

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List of Acronyms

AHA	:	ASEAN Coordinating Center for Humanitarian Assistance on Disaster Management
BAPPENAS	:	National Development Planning Agency (Indonesia)
BRR	:	Aceh/Nias Rehabilitation and Reconstruction Agency (Indonesia)
DMC	:	Disaster Management Center (Sri Lanka)
GAM	:	Gerakan Ache Merdeka
HFA	:	Hyogo Framework for Action
IOTWS	:	Indian Ocean Tsunami Warning System
LTTE	:	Liberation Tigers of Tamil Ealam
NDMCC	:	National Disaster Management Coordinating Committee (Sri Lanka)
RADA	:	Reconstruction and Development Agency (Sri Lanka)
RPJMN	:	National Medium-Term Development Plan (Indonesia)
TAFOR	:	Task Force for Relief (Sri Lanka)
TAFREN	:	Task Form for Rebuilding the Nation (Sri Lanka)
TAP	:	Transitional Accommodation Project (Sri Lanka)
TEW	:	Tsunami Early Warning

1 INTRODUCTION

Disaster management, climate change adaption, environmental management and poverty reduction have been dealt with and studied independently, but recent efforts to engage these research areas have aimed towards reducing socio-economic vulnerability to natural disasters[1]. Nevertheless, such efforts have not been fruitful so far, as an increasing number of people are being exposed to larger vulnerability and economic losses. What is more, the number of the human casualties occurring as a result of natural disasters in increasingly being concentrated in developing countries. Thus, the escalating concerns regarding climate change and climate-related natural disasters are increasing the need for long-term adaptation and damage reducing measures in vulnerable regions. While extreme temperature highs, seasonal storms, excessive precipitation and associated flooding, and lack of precipitation and associated drought are all extreme weather events that can lead to natural disasters, this research intends to focus on extreme storms and flooding for these tend to have the most immediate and obvious impacts in terms of human casualties and

1 Thomalla, Frank, et al. "Reducing hazard vulnerability: towards a common approach between disaster risk reduction and climate adaptation." *Disasters* 30:1 (2006). pp. 39-48.

severe infrastructure destruction[2].

More specifically, this research will examine the various domestic capacity building initiatives as well as disaster management strategies revolving around Southeast Asian countries affected by the 2004 tsunami (Indonesia and Sri Lanka, the two most affected nations) for this topic may be relevant to developing nations in terms of socioeconomic development. As most nations in affected regions are categorized as developing countries, an active response to the increasing risk of natural disasters through such initiatives seems crucial in both preventing economic losses and protecting populations.

In the context of the 2004 tsunami, Indonesia and Sri Lanka had significant similarities in regarding their domestic atmospheres. Geographically, both are island nations, making them especially vulnerable. Indeed, these two countries were the most severely affected among all damaged countries by the 2004 tsunami. What is more, the livelihoods of these affected areas were also similar; in both countries, the economically worse off regions were the most heavily damaged. The eastern coastal lines of Sri Lanka, which were the most heavily hit, contribute the least to the

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2 Anderson, Jason, and Bausch, Camilla. "Climate Change and Natural Disasters: Scientific evidence of a possible relation between recent natural disasters and climate change." *Policy Department Economic and Scientific Policy* (2006).

national GDP. The Aceh province is one of Indonesia's poorest regions, with close to 1/3 of the population living under the poverty line[3]. And due to the catastrophic consequences of the disaster in 2004, both countries have undergone significant investigation and long-term efforts towards disaster resilience building. In other words, Sri Lanka and Indonesia can be considered as two country cases in which the 2004 tsunami served as a major motivation for institutional change[4]. Indonesia and Sri Lanka, being respectively the first and second most damaged country by the 2004 tsunami, both countries have recognized the need to systematically prepare for possible future natural disasters. Nevertheless, the actual progress of these two countries seem quite diverging. In the case of Indonesia, there are ongoing efforts to dealing with and emphasizing post-management of disasters within its national development plans, characteristically through multi-level institutional arrangements[5]. In Sri Lanka on the other hand, disaster management strategies, including long-term disaster resilience building, are not sufficiently accounted for in urban planning, let alone

3 Statistik, Badan Pusat. "Provincial Human Development Report Aceh 2010: Human Development and People Empowerment." UNDP.

4 Seng, Denis Stanley Chang. "Tsunami resilience: Multi-level institutional arrangements, architectures and system of governance for disaster risk preparedness in Indonesia." *Environmental Science & Policy* 29 (2013): 57-70.

5 National Medium-Term Development Plan (RPJMN) 2010-2014. Ministry of National Development Planning. Government of Indonesia.

national development plans[6]. The differing paths of these two countries arouse questions to why Sri Lanka's post-tsunami capacity building has less focus on macroscopic and long-term resilience building, while that of Indonesia has reached a considerable level of institutional change despite similar post-disaster conditions.

Given this, the purpose of this research is to investigate how the short-term recovery and long-term resilience building varies depending on a government's capacity. More specifically, it will focus on the impacts of institutional coordination (or its lacking) on building government capacity.

Short-term and long-term resilience building will be divided as they should be dealt as two different processes. Short-term resilience is indicative of elastic recovery; immediate relief and recovery acts pertain to activities of short-term resilience. Reconstruction projects that are targeted towards simply restoring the original state of the damaged area should also be considered in the short-term timeframe. Long-term resilience building activities however, include post-disaster actions that lead to transformation and improvement compared to the damaged area's original state. Government projects or initiatives that aim to enhance pre-disaster

6 Ratnasooriya, Harsha A. R., et al. "Post Tsunami Recovery Process in Sri Lanka." *Journal of Natural Disaster Science* 29:1 (2007). pp. 21-28.

resistance towards natural disasters (e.g. mitigate anticipated damage, increase preparedness) should be taken as long-term resilience building. Thus, reconstruction projects that incorporate disaster risk reduction measures can be regarded as long-term resilience building.

The divide between short-term and long-term resilience does not only pertain to time but also to the institutional capacity required for their reinforcement. Unlike short-term resilience building which mostly involves physical rebuilding, long-term further demands social and economic resilience building. Extensive infrastructure development as well as public education are also important elements of long-term resilience. Therefore, the specific agenda of the research questions can be separated into two time frames: 1) the effects of government coordination during the early stages of recovery, and 2) its effects in the long-term during resilience and capacity building stages. Two cases of been selected for comparison.

Data collected through government reports, community-level assessments, agency evaluation reports, as well as academic papers suggest that in the short-term, lack of government coordinating capacity can be compensated by the influx of international aid. Cases from both Sri Lanka and Indonesia show that the gap in governmental control of affected areas can be filled via the institutional capacities of international organizations.

In the long-term resilience building process however, central government coordination was revealed to be an important factor.

1.1 Research Questions

Despite the fact that numerous Southeast Asian nations experienced severe damages in population and infrastructure due to the 2004 tsunami, the systematic responses following the incident as well as efforts towards additional capacity building after the incident seems to differ by government. Thus, in addition to analyzing how the immediate response and recovery process differed in Sri Lanka and Indonesia, this research will also attempt to study how disaster management strategies are integrated into key social institutions as well as study the reasons behind possible different approaches to disaster resilience between the two countries. Furthermore, this research will attempt to analyze why Indonesia is currently receiving positive attention for their domestic and international initiatives toward long-term disaster resilience. In doing so, the reasons to why Sri Lanka is failing to receive such attention as well as the possible factors or obstacles preventing Sri Lanka from constructing an effective disaster coordination mechanism will be examined.

This research will mostly utilize qualitative analysis in order to

compare the processes and outcomes of various responses to the 2004 tsunami. First, comparative analysis on the immediate aftermath of this natural disaster will be done based on two time frames: emergency relief, and immediate reconstruction. Apart from long-term resilience building, the effectiveness of the short-term relief and recovery processes of the two countries will be separately evaluated.

Secondly, the Hyogo Framework for Action (HFA) will be used to assess Indonesia's and Sri Lanka's progress in long-term risk management. The HFA is a plan drafted by the United Nations International Strategy for Disaster Reduction (UNISDR) in order to specify the work that is necessary from various institutional actors to reduce disaster damage and increase disaster resilience. National Progress Reports published by the governments of Indonesia and Sri Lanka will be studied to analyze the progress in implementing disaster management initiatives outlined by the HFA. For each nation, progress reports for two cycles selected and compared for analysis.

1.2 Structure of Thesis

The remaining part of this thesis is largely divided into three parts. Chapter 2 will be a literature review covering the general natural disaster

management process and theories on disaster resilience building in relation to the research questions outlined above. Previous work concerning the linkage between effective institutional coordination and policymaking will also be reviewed.

In chapter 3, the details of the short-term and long-term management processes of the two cases will be discussed. Both the Indonesian and the Sri Lanka case will show that lack of institutional coordination can be overcome by international relief aid and domestic emergency relief measures during the very early stages of disaster recovery. The Indonesia case will demonstrate the importance and necessity of good quality coordination based on an effective central agency and fluent information sharing among various government institutions in long-term disaster capacity building.

Lastly in chapter 4, two examples of post-disaster resilience building measures (one for each country) will be examined. For Indonesia, disaster resilience building policies incorporated into urban planning will be reviewed. In addition, Sri Lanka's emphasis and extended outcomes in early warning system will be examined as a case representing current Sri Lanka's national directionality regarding disaster capacity building.

2 LITERATURE REVIEW

This chapter will provide a literature review on two major themes dealt with in this thesis. The first (section 2.1) is disaster management; as this thesis attempts to analyze the disaster management process in short-term and long-term timeframes, the literature review will outline which separate phases of the disaster management system pertain to short and long-term approaches. Section 2.2 of the literature review will cover various viewpoint towards disaster resilience.

2.1 Disaster Management

Disaster management, or emergency management is widely described in terms of "phases" by policy makers and researchers. The theoretical approach concerning phases has been used for more than 80 years now; the concept was further organized by David Neal in 1997 as he classified the different approaches of various researchers[7]. While different approaches each outlined different numbers of phases, the standard now used to describe risk management is the five phases system: prevention, mitigation, preparedness, response and recovery. In the context of natural

7 Neal, David. "Reconsidering the Phases of Disaster." *International Journal of Mass Emergencies and Disasters* 15:2 (1997). pp. 239-264.

disasters however, the phase "prevention" is omitted as preventing natural disasters is in almost all cases not a feasible strategy to adopt. The remaining four (mitigation, preparedness, response, and recovery) on the other hand, are often referred to as a cycle in which adjoining phases are overlapping[8]. This view notes that separate risk management initiatives are not applicable at single phases only, but can also be relevant to more than one, or be at the boundary in between phases.

Depending on the actor and emergency, each of the four phases can involve different functions. In terms of natural disasters such as earthquakes, floods, and tsunamis, the mitigation phase involves assessing possible risks in order to minimize avoidable dangers. Examples include introducing "earthquake valves" that automatically cut off gas and electricity supply in order to avoid fires or explosions. Mitigation measures can also be incorporated into regulating construction plans so that residential and commercial buildings as well as furniture are durable in earthquakes. In addition, improving drainage systems on the streets as well as inside buildings is also a mitigation measure pertaining to areas prone to flooding. Likewise, mitigation focuses on pre-disaster measures that

8 Baird, Malcom E. "The 'Phases' of Emergency Management." Background Paper (2010). Intermodal Freight Transportation Institute (IFTI), University of Memphis.

minimize risks. All in all, mitigation at the national level is highly relevant with the national budget and legislative initiatives.

Preparedness is concerned with having equipment and personnel lined up for immediate use when the emergency occurs. The main target of this phase is to react efficiently and effectively in the case of a natural disaster so that the impacts are further reduced and vulnerabilities attended to. Measures of preparedness exist at different levels; planning can occur at national, local, and sometimes family levels. The importance of school based preparedness plans are also commonly emphasized (e.g. classroom emergency kits, response teams, training, etc.) At the governmental level, intricate evacuation plans, rescue equipment and personnel, and ready medical systems are emphasized. In sum, preparedness at the governmental level heavily requires comprehensive risk planning, public information dissemination, and wide public training activities.

The fourth phase, response, requires speedy providing of basic humanitarian needs to the damaged region and population. In cases dealing with severe natural diseases, the response phase is most likely to begin with search and rescue operations, followed by emergency medical treatment and temporary shelter installations. Ideally, this stage of disaster

management can be realized via effective nationwide coordination among relevant agencies; however, donations, financial aid, and other types of humanitarian assistance from international organizations are accompanied.

The last stage of disaster management is the recovery phase. At this point, immediate threats have diminished, and the main objectives remaining are retaining damaged regions, and recovering the population's socioeconomic livelihoods. Like the first phase (mitigation), the recovery phase also requires a significant degree of state budget planning and legislative initiatives. Statewide coordination of implicated national agencies and their programs is also important for productive and competent rebuilding.

The concept of recovery however, can be discussed in two separate ways; first, recovery can be described as process of "restoration," in that living standards, infrastructure, community structure, as well as economic livelihoods return to the same level prior to the natural disaster (Maguire and Hagan, 2007)[9]. Recently, the mode of optimal recovery is shifting from "restoration" to "transformation." What is more, this concept of "transformation" insinuates that optimal recovery is in fact improved

9 Maguire, Brigit and Hagan, Patrick. "Disasters and Communities: Understanding Social Resilience." *Australian Journal of Emergency Management* 22:2 (2007).

resilience to natural disasters.

This thesis focuses and expands on this aspect that long-term resilience building is a transformation process that is highly dependent on the leadership and capacity of the government. While the above approach of analyzing disaster management in terms of phases is logical, it does not take into consideration the fact that mitigation and preparedness measures (closely related to long-term disaster management) can be close to nonexistent before a country is attacked by a natural disaster. The countries studied in this thesis are such cases. For such countries, the above approach that emphasizes a step-by-step course of action can be less practical.

2.2 Perspectives of Disaster Resilience

The notion of improved resilience as optimal recovery previously mentioned in section 2.1 has been studied in various contexts and perspectives. But in general, comprehensive resilience (in other words, a transforming and improving process rather than a restoring process) encompasses the psychological and behavioral notion that people that have been exposed to adverse events tend to grow in preventing and coping

capacity (McMillen, 1999)[10].

In a similar respect, it has been argued that building resilience can also be viewed differently from simple ability to physical recover. Maguire and Cartwright (2008) write about social resilience, in which they categorize the recent perspectives into three major views: resilience as stability, resilience as recovery, and resilience as transformation. According to Maguire and Cartwright, the most recent perspective on resilience, resilience as transformation, stresses that optimal resilience requires "changing to a new state that is more sustainable," rather than simply bouncing back to the original state as suggested by resilience as recovery and stability[11]. While these authors talk mainly about how a struggling society can respond to changing atmospheres (e.g. economic hardship) through innovation and development, the transformation view of resilience should also be of significance to natural disaster resilience. Moreover, the differentiation of resilience as recovery and resilience as transformation can also be applied in relation to the timeline of disaster management. In other words, the concept of resilience as recovery (or bouncing back to the

10 McMillen, J. Curtis. "Better for it: How People Benefit from Adversity." *Social Work* 44:5 (1999). pp. 455-468.

11 Maguire, Brigit and Cartwright, Sophie. "Assessing a Community's Capacity to Manage Change: A Resilience Approach to Social Assessment." Canberra Bureau of Rural Sciences (2008).

pre-disaster state) pertains to short-term resilience building, and the concept of resilience as transformation is linked to long-term resilience building. The division between short-term and long-term resilience building will be re-visited in later discussions.

Meanwhile, in relation to the general discussion of resilience, Winkworth (2007)[12] identifies three elements that are required for its building: capacity to predict disasters, ability to recover from the shock and damage, and the capability to "innovate and improvise to reach improved levels of social functioning" (Aguirre, 2006)[13].

While these discussions pertain to a wider range of disasters (e.g. acts of terror such as school shootings), the same three elements can definitely apply to large scale natural disasters. At the same time, these studies do not explicitly mention the importance of a single comprehensive actor that can effectively look over the holistic process of building social resilience to disasters that can coordinate all three elements into a nationwide project.

Various discussions of social capital have also argued that the higher degree to which communities turn to self-help and each other point

12 Winkworth, Gail. "Disaster Recovery: A Review of the Literature." Institute of Child Protection Studies (2007).
13 Aguirre, Benigno E. "On the Concept of Resilience." Disaster Research Center (2006).

to better social resilience. These discussions on social capital also argue for the importance of various inter-community relationships in the community recovery process. Such relationships can include individual bonds, civil networks, as well as links in between civil institutions (Healy and Hampshire, 2002)[14]. Nevertheless, even in the community sphere, the role of the central government cannot be undermined in the sense that government policies can work to both enforce and strengthen such links or undermine them.

Another study that has pointed to key elements to successful disaster recovery and resilience building discusses the role of local knowledge (A. R. Kahn, A. Kahn & Razzaq, 2013)[15]. In the context of community recovery, these authors argue that local knowledge (e.g. traditional knowledge, indigenous knowledge) regarding health, water management, soil management, agricultural practices, fishing methods, food conservation techniques, and meteorological local knowledge can function as deciding factors of a successful recovery process. In this study, the authors specify that local knowledge listed above is not equal to

14 Healy, Karen and Hampshire, Anne. "Social Capital: A Useful Concept for Social Work?" *Australian Social Work* 55:3 (2002). pp. 227-238.

15 Khan, Abdul Razzaq, et al. "Conceptualizing Local Knowledge and Disaster Management." Munich Personal RePEc Archive Paper No. 63355 (2013).

scientific knowledge in that local knowledge is intuitive, communicated historically through subjective methods (instead of literature), learned through hands on experience, and most importantly, qualitative. Nevertheless, they emphasize that the appropriate use and understanding of local knowledge is important in implementing disaster management and developmental projects in communities that are less exposed, or less accessible to modern technologies and lifestyles.

However, as with social capital, the role of local knowledge also seems to be a subordinate element to be taken into account within the central government's strategic disaster management framework. In other words, social capital and local knowledge do not seem to be the fundamental element leading to successful recovery and increased resilience. While these factors can be considerably helpful in local contexts, a nationwide project of natural disaster recovery and long-term resilience building cannot rely on solely social capital and local knowledge. In contrast, this thesis, through a comparative analysis of two country cases, attempts to identify government coordination capacity as the fundamental variable behind successful natural disaster resilience building.

3 COMPARISON OF SHORT-TERM RESPONSES AND RECOVERY PROCESSES

3.1 SRI LANKA

3.1.1 Damage [16]

Aside from sporadic typhoons, seasonal monsoons, and random landslides, Sri Lanka had been relatively far from massive natural disasters. However, when the tsunami struck on December 2004, it was recorded as the severest natural disaster that Sri Lanka ever experienced. The damage of the 2004 tsunami on the island of Sri Lanka was unlike that of other countries in that it affected more than two thirds of the island's shores. The most heavily affected coastal boarders were the northern and eastern, starting from the Jaffna peninsula down until the Dondra Head (southern end of the island). However, even the relatively guarded western and southwestern coastline experienced flooding. Hence, when the waves struck the shorelines, the country was completely unprepared; because there was no warning system working in place, people were left extremely

16 Section 3.1.1. was written largely based on information provided by the following government document: Sri Lankan Ministry of Finance and Planning. Post-Tsunami Recovery and Reconstruction. Prepared by the Ministry of Finance and Planning and the Reconstruction & Development Agency (RADA) in consultation with Development Partners, Representative of the INGOs & NGOs, Private Sector and the Civil Society (2006).

vulnerable with nearly zero mitigation efforts.

As a result, more than 35,000 people died and 20,000 were injured. Thousands went missing, and more than 1,500 children were orphaned. Even more were widowed. Moreover, nearly 100,000 homes were destroyed, leaving approximately 500,000 removed from their homes. In addition to the infrastructure damage (houses, roads, water supply, railways, hospitals, communication, electricity, etc.) the environment also encountered severe damage due to the sudden and massive intrusion of salt water. Soil was subject to erosion (about 10,000 ha of land was salinated), and mangroves as well as coral reefs were significantly harmed. Damage to the tourist industry was considerable, as many hotels near the coastline were destroyed along with related tourist businesses.

The costs of damages to the environment as well as the country's infrastructure was estimated to exceed 900 million USD, and it was estimated that it would require roughly 2.2 billion USD to rehabilitate and reconstruct the country. A minimum of three to five years would be needed. The Asian Development Bank announced in 2005 that the economic loss due to the tsunami accounted for nearly 5% of the country's GDP, while predicting that the costs of rehabilitation and reconstruction would hinder the country's growth by approximately 1%.

3.1.2 Stage 1: Emergency Relief [17]

For a country with close to none prior experience with a natural disaster so severe, immediate relief efforts (emergency medical aid, food, water, other supplies) were reasonably successful. In most affected areas, required supplies and medical teams were dispatched by international relief organizations within one day, and remaining school and other public buildings were quickly transformed into temporary shelters. Thereafter, payments in cash by the government were provided to families along with weekly rations, and funeral expenses were also distributed systematically in attempt to contribute to preventing disease outbreaks. Although some degree of lack of coordination caused small troubles, the initial response turned out to be mostly successful. Coordination problems in this initial response stage included regional differences in availability of food rations, as some communities argued that the distributive process of grants and food was applied differently in different regions. The next stage after relief (recovery and reconstruction) however, were to exhibit even more challenges in coordination.

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17 Section 3.1.2 was written largely based on information provided by the following government document: Sri Lankan Government, Post Tsunami Recovery and Reconstruction. Joint Report of the Government of Sri Lanka (GoSL) and Development Partners (2005).

3.1.3 Stage 2: Immediate Recovery and Reconstruction

Immediate recovery of the 2004 tsunami was done heavily through foreign financial contributions from the private sector and NGOs. The contributions of bilateral donors, multilateral agencies, NGOs, and the private sector reached approximately 2,229 million USD[18]. However, most of such efforts were focused on simple asset replacement and recovery rather than a comprehensive community development strategy. As a result, the pre-existing vulnerabilities were not attended to, leaving damaged communities as susceptible to risk as they were before. Many projects carried out at the national level were rushed and poorly planned out, which resulted in severe long-term consequences for affected communities. Competitive aid agencies especially rushed construction projects. What is more, some aid agencies as well as NGOs showed competitive attitudes towards recovery projects, further disorganizing the coordination among such groups and the government of Sri Lanka[19]. Due to poor coordination, financial problems also appeared. Although at first the contracted foreign financial aid seemed to suffice, mismanagement of such funds resulted in

18 Cooray, S. "Donor, Support, Pledges, Commitments and Expenditure." Sri Lanka Development Forum: Background Papers (2005).

19 Jayasuriya,S., et al. "Post-Tsunami Recovery: Issues and Challenges in Sri Lanka." ADB Institute Research Paper Series, No. 71 (2006).

complications in distribution, relief payments (which were cut from the promised amount), and coordination of projects[20].

For effective recovery after the tsunami, coordination within the government (local and central), was also required in addition to coordination among NGOs. In most of the affected districts, committees were formed for the purpose of coordinating between the central and local government. However, there existed ambiguities regarding the precise amount of authority that the local governments had. As a result, while the local government had structures established for rebuilding housing and reconstructing livelihoods, they were not able to operate properly. For example, Provincial Councils which are the locally elected institutions, were granted limited access to recovery activities in the first year after the disaster. As a result, local peoples' interests were not well included in the recovery plans, and the aid workers (often communicating with the central government) thus lacked understanding of the pre-existing vulnerabilities. Similarly, new settlement projects gave little thought to basic infrastructure (water supply, spatial arrangements, etc.), let alone improved resilience. Moreover, contributions made by relief organizations and local people were

20 Sri Lanka Task Force for Rebuilding the Nation (TAFREN). "Rebuilding Sri Lanka: Post-tsunami Reconstruction and Rehabilitation." (2005).

not well recorded although disaster-prone areas can benefit significantly via prior documentation if made available. Exceptionally in the Kudilnilam area, the Sri Lankan People's Church took charge (in place of the national government) of screening the quality of new housing and communities[21]. Under the church's leadership, houses were allocated before construction, and prospective residents were briefed on construction plans, creating room for negotiation between contractors and local residents. The church further saw to prevent contractors being paid in the case that key specifications were not met.

The central government of Sri Lanka on the other hand, utilized TAFREN (Task Form for Rebuilding the Nation) as the main institution overlooking the reconstruction of key infrastructure. However, TAFREN showed that it lacked ability to coordinate key government agencies relevant to recovery activities. The original intent of establishing TAFREN was so that it could work as a "one-stop" agency encompassing a comprehensive line of key ministries; however, such a role was not sufficiently fulfilled. In government efforts to improve upon such weaknesses, the Sri Lanka's Reconstruction and Development Agency

21 Mulligan, M., and Nadarajah, Y. "Sharing and Elaborating Post-tsunami recovery Research Outcomes," Report on the Hamabantota Symposium, Monash University and RMIT University. (2010).

(RADA) was formed through the merger of TAFREN with two other tasks forces: Task Force for Relief (TAFOR), and Transitional Accommodation Project (TAP). RADA aims to reduce future vulnerability to natural disasters by improving physical infrastructure. Nonetheless, the government of Sri Lanka failed to deliver appropriate levels of performance in the recovery stage[22], which suggests a lack of institutional capacity despite the repeated initiatives. Nevertheless, the role of international humanitarian agencies (despite some problems mentioned above) cannot be ignored, as their reconstruction aid, grants, and material supply contributed majorly to Sri Lanka's initial recovery process. In other words, rudimentary levels of re-building and livelihood restoration were made possible via international aid.

3.2 INDONESIA

3.2.1 Damage

In Indonesia, tsunamis amount to only 6.4% of the disasters that influence the country. Nevertheless, tsunamis have the highest impact in terms of both human casualties and economic loss[23]. According to the

22 Keraminiyage, K., et al. "Post Tsunami Recovery Capacity Gaps in Sri Lanka." Research Institute for the Built and Human Environment, University of Salford. (2008).

23 Ministry of Research and Technology (RISTEK). "Grand Scenario of Indonesian

official statistics issued by the government of Indonesia after the 2004 incident, a total of 128,728 people died, 500,970 were displaced, and 179,312 houses were swept away. Moreover, approximately 4,270 million USD were estimated as the total economic loss. Sumatra (island located at the western part of Indonesia) was the most affected, with its western and northern coastal borders nearly demolished.

The Aceh province in particular experienced the most severe damages, as most of the human fatalities in Indonesia occurred in this province[24]. Residential areas near the coastlines were largely swept away; even the villages that had withstood the shaking due to the earthquake prior to the waves were susceptible to the tsunami waves. And while electricity plants were surprisingly undamaged, initial assessments determined that they were down simply because there was no demand for electricity as most constructions were in no condition for electricity supply. A considerable portion of the electricity distribution system was blown away. In addition, the damaged areas suffered from fuel shortage due to the damage that the state-owned petroleum company's fuel storages

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Tsunami Early Warning System." Government of Indonesia. (2005).

24 Rofi, Abdur, et al. "Tsunami mortality and displacement in Aceh province, Indonesia." *Disasters* 30:3 (2006). pp. 340-350.

experienced[25]. In relation, the Aceh population's livelihoods were severely damaged as the oil and gas industry comprised more than 40% of the province's regional GDP. The second most contributing economic sector was agriculture, another sector that experienced destruction. Fisheries, livestock, and land crops were mostly destroyed, further jeopardizing the Aceh population's livelihoods. In whole, the World Bank calculated that the Aceh province lost 4.45 billion USD due to this disaster, which is almost equivalent to 100% of this province's GDP one year prior or about 2.3% of Indonesia's total GDP.

3.2.2 Stage 1: Emergency Relief

Compared to Sri Lanka, Indonesia's emergency relief and rescue process was prolonged. While Sri Lanka was able to reach the affected areas within days, the severity of the situation in the Aceh province was informed to most Indonesians (and the rest of the world) two days after the waves struck. Due to the internal conflicts between the Free Aceh Movement and the Indonesian government, information dissemination was heavily limited. Aid and relief was able to reach the province only by the

25 Cluff, Lloyd S. "Effects of the 2004 Sumatra-Andaman Earthquake and Indian Ocean Tsunami in Aceh Province." *The Bridge: Linking Engineering and Society* (2007). National Academy of Engineering.

28th of December (two days after the disaster), the Free Aceh Movement announced ceasefire. Ultimately, tsunami ended the war in the Aceh province, as the civil war between the Free Aceh Movement and the Indonesian government unexpectedly decelerated after the tsunami, and eventually ended shortly after[26].

Once the damage at the Aceh province became public, emergency relief efforts reacted immediately. Health and hygiene support, emergency shelters, as well as basic necessities such as food and water were supplied through various channels including UN agencies, foreign donations, and international NGOS.

3.2.3 Stage 2: Immediate Recovery and Reconstruction

In the case of Indonesia, the shift from emergency relief to recovery was as rough as the case of Sri Lanka. Following the immense amount of donations from relief agencies targeted at basic medical care, food, and water, the focus was soon shifted to restoring the livelihoods. NGOs such as the Terre des Hommes (Italian) in tandem with the UNDP worked on reconstruction of major income-generating industries in the Aceh Province.

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26 Billon, Philippe. "Peace in the Wake of Disaster? Secessionist Conflicts and the 2004 Indian Ocean Tsunami." *Transactions of the Institute of British Geographers*. 32:3 (July 2007). pp. 411-427.

Rebuilding fisheries and other aquaculture plants were the focus of such developmental projects. Reconstruction of schools, major healthcare facilities, as well as other basic infrastructures were also immediately targeted for replacements.

But just like Sri Lanka, rebuilding houses were among the major challenges; In the Aceh province one year after the disaster, more than 80% of the displaced residents remained without permanent housing. The main reason for this was argued to be the government's intentions to act as the controlling center of village planning[27]. The government aimed for improvement in disaster resilience via long-term development and thorough village planning, which showed slow progress. Most importantly, the central authority in regards to rehabilitation and reconstruction was passed around in the middle of planning during its early stages. Originally, the nationwide reconstruction process was to be coordinated by two governmental agencies, the National Development Planning Agency (BAPPENAS) and the Ministry of Public Works. However, like the case in Sri Lanka, the main complaint was that central government-led rebuilding initiatives failed to take into consideration the specific local demands. Only

27 Kaplan, Eben. "Tsunami Rebuilding Efforts, One Year Later." Council on Foreign Relations (Dec. 2005).

months after the incident (in May of 2005), the Aceh and Nias Rehabilitation and Reconstruction Agency (BRR) was installed to incorporate local input to the recovery process[28]. The introduction of this new community-based control center naturally prolonged the reconstruction process as much of the community's personnel and material resources were compromised.

And due to disagreements between the BRR and BAPPENAS regarding the details of the recovery plans, the general domestic agencies exhibited limited operational power, leaving most of the tangible achievements to international NGOs and foreign aid. For example in the meantime, NGOs such as the Terres des Hommes took the lead in providing affected populations with financial assistance in the form of microeconomic initiatives. Small cash payments were allocated so that affected communities could readily return to economic activities.

Tables 1 and 2 summarize the differences as well as strengths and weaknesses of the short-term response and recovery processes of Sri Lanka and Indonesia discussed in sections 3.1 and 3.2.

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28 Steinberg, Florian. "Housing Reconstruction and Rehabilitation in Ache and Nias, Indonesia--Rebuilding Lives." *Habitat International* 31 (2007). pp. 150-166.

	Stage 1: Emergency Relief	**Stage 2: Immediate Recovery and Reconstruction**
Sri Lanka	**STRENGTHS** • quick initial response (within a single day) • medical assistance, food and water supply, emergency shelters provided by NGOs and foreign donations (aid) • cash payments for livelihood restoration distributed by the government **WEAKNESSES** • regional differences in availability of food rations and financial grants	**STRENGTHS** • important role of local and community based groups (e.g. churches) **WEAKNESSES** • heavily relied on foreign financial contributions from the private sector and NGOs • simple asset replacement, rather than comprehensive community re-development • rushed recovery projects (NGO competition), mismanagement of foreign funds • coordination problems between the central and local governments • inability of TAFREN in coordinating key government agencies • reconstruction activity limited in certain areas due to civil conflict with LTTE

Table 1: Variations in Short-Term Recovery Processes (Sri Lanka)

	Stage 1: Emergency Relief	Stage 2: Immediate Recovery and Reconstruction
Indonesia	**STRENGTHS** • medical assistance, food and water supply, emergency shelters provided by NGOs and foreign donations (aid) **WEAKNESSES** • delayed initial response due to internal conflict in the Aceh region which limited information flow (severity of damage in Aceh province not acknowledged until two days after the incident)	**STRENGTHS** • successful NGO influence in restoring major income-generating industries (fisheries, aquaculture) • local agency established for housing reconstruction **WEAKNESSES** • heavy reliance on international agencies • extremely slow progress in restoring permanent housing in the Aceh Province • mismanagement due to shifts in control centers

Table 2: Variations in Short-Term Recovery Processes (Indonesia)

3.3 VARIATION

In addition to the differences in immediate response and recovery experiences outlined in the previous section, another common domestic factor contributed to the short-term process. Coincidentally, both Indonesia and Sri Lanka were dealing with separatist movements; nevertheless, these internal conflicts led to considerably different outcomes.

3.3.1 Different Experiences Dealing with Ongoing Civil Conflicts

One major contrast between the two countries' recovery processes was made by Enia in terms of the effects and outcomes of civil wars[29]. Sri Lanka and Indonesia were both experiencing internal conflicts with separatist groups: Sri Lanka with the LTTE in the northern regions, and Indonesia with the GAM (Gerakan Ache Merdeka) in the Aceh province. The tsunami aided in ending the internal conflicts in Indonesia, while it aided in escalating the conflict in Sri Lanka. The tsunami, by altering the bargaining powers of the separatist groups, either led peace or increased conflict.

Unlike how the conflict between the Free Aceh Movement and the Indonesian government ended due to the national disaster in 2004, Sri Lanka experienced an opposite outcome regarding its civil war with the LTTE (Liberation Tigers of Tamil Eelam)[30]. In Indonesia, although there was a slight delay of initial response to the Aceh province due to the GAM forces (roadblocks and information disconnection led to the national government being unaware of the damages in this area for nearly two days) an ad

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29 Enia, Jason. "Peace in its Wake? The 2004 Tsunami and International Conflict in Indonesia and Sri Lanka." *Journal of Public and International Affairs* 19 (2008).

30 Yamada, Seiji et al. "The Sri Lanka Tsunami Experience." *Disaster Management & Response* 4:2 (2006). pp. 38-48.

interim peace agreement was signed between the GAM rebels and the nation government less than 1 year after the tsunami in December 2004[31]. Due to this tentative agreement, reconstruction work was readily provided to this heavily damaged province; moreover, this tentative agreement soon after developed into a permanent peace agreement, thus ending the civil conflict in Indonesia.

Unlike the Indonesian case, the tsunami did not lead to the end of conflict for Sri Lanka. On the contrary, the conflicts lasted significantly, and eventually hindered the country's recovery process. One example particularly relevant to a major roadblock to immediate recovery is how the civil war fostered communication problems as well as security problems; much delay in construction work was caused due to restricted access to militant-controlled areas[32]. The LTTE controlled regions included the northern and northeastern parts of the island; unfortunately, some of these regions were of the most severely affected by the 2004 disaster.

Essentially, although a mutual arrangement between the government and the LTTE was required for an effective flow of aid, such an

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31 Aglionby, John. "Legacy of Tsunami Brings Peace to Aceh," *The Guardian*, 15 August, 2005.

32 Palliyaguru, Roshani and Amaratunga, Dilanthi. "Improving Infrastructure to Reduce Future Vulnerabilities to Natural Disasters: Review of Infrastructure Development Associated with Post Tsunami Reconstruction in Sri Lanka." CIB World Building Congress. (2007).

arrangement was not solidified. One main political reason was due to the fact that a significant portion of the government as well as the public refused to sign a deal with the LTTE, worrying that such an agreement would grant the LTTE official recognition as an independent administrative authority. The LTTE as well refused to sign deals, considering them means through which their control in certain regions could be diminished.

Nevertheless, an MOU was eventually drafted between the Government of Sri Lank and the LTTE. This MOU, called the "Post-Tsunami Operation Management Structure" outlined how funds and other resources would be delivered to regions controlled by the LTTE forces[33]. The World Bank was hoped to serve as an objective intermediate holder of a separate Regional Fund, to which nongovernmental donors would directly deposit their donations. In this way, funds reaching the LTTE controlled regions would somewhat bypass the Sri Lanka government. However, soon after the agreement made, the Supreme Court of Sri Lanka ruled against it in response to heavy opposition from the majority of the society. Moreover, a considerable portion of the donors expressed concerns regarding a "direct" transfer of funds to the LTTE, which at the time was labeled as a terrorist

33 Jayasuriya, S. K. and McCawley, Peter. *The Asian Tsunami: Aid and Reconstruction After a Disaster.* Edward Elgar Publishing. (2005).

organization in some nations.

In sum, both countries were initially experiencing limited physical access to damaged areas due to civil conflicts; however, Sri Lanka at first had the advantage as it was at least able to acquire timely information regarding tsunami damage. Indonesia on the other hand, was under more severe limitations as information blockage was significant. The final outcomes however were opposite: Indonesia was able to organize a quick ceasefire (which ultimately led to the end of this civil war) which not only facilitated government reconstruction work, but also pulled in more international emergency and humanitarian aid. Sri Lanka on the other hand could not reach a proper ceasefire. An MOU was drafted instead. Nonetheless, because there was not official peace agreement between the two parties, international aid was not as actively supplied. In the end, the rate and quality of recovery in these two regions were highly dependent on international financial aid. Despite both governments' efforts to coordinate reconciliation most appropriate to then circumstances, ultimately, the existence or nonexistence of foreign humanitarian aid was the major determinant factor in reconstruction projects.

4 COMPARISON OF LONG-TERM CAPACITY AND RESILIENCE BUILDLING STRATEGIES

Following the short-term response and recovery process, this chapter focuses on the approaches that the two countries of interest have taken in building long-term capacity and resilience towards natural disasters (especially tsunamis). In doing this, The *Hyogo Framework for Action (2005-2015): Building the Resilience of National and Communities to Disasters* will serve as a major reference point as it provides a holistic and systematic approach to disaster risk management. This framework was first adopted at the World Conference on Disaster Reduction in January 2005 and many countries including Sri Lanka and Indonesia have worked to implement it.

Specifically, this framework aims to guide vulnerable countries into building capacity in 1) governance (organization, legal, and policy frameworks), 2) risk identification, assessment, monitoring and early warning, 3) knowledge management and education, 4) reducing underlying risk factors, and 5) preparedness for effective response and recovery. Biennial progress reports published from the two countries in interest will be examined in order to assess each country's improvement between years

2007 and 2013. The indicators outlined by the Hyogo Framework for each of the five categories mentioned are summarized in the following table.

Goals	Indicators	Category
① Governance (organization, legal and policy frameworks)	1) national policy and legal frameworks for DRR with decentralized responsibilities and capacities 2) dedicated and adequate resources available in implementing DRR plans at all administrative levels 3) community participation induced through delegation of authority and resources to local levels 4) functioning national multi-sectoral platform for DRR	Mitigation/ Preparedness
② Risk identification, assessment, monitoring and early warning	1) national and local risk assessments based on hazard data and vulnerability information are available 2) systems operate to monitor, archive and disseminate data on key hazards and vulnerabilities 3) early warning system is operating 4) risk assessments consider regional/trans-boundary risks, and the possibility of regional cooperation	Mitigation/ Preparedness /Recovery
③ Knowledge management a education	1) information on disasters is accessible to all stakeholders through development of an information sharing system 2) schools conduct training programs regarding DRR and recovery practices 3) research methods for risk assessments and cost benefit analysis are developed 4) culture of disaster resilience developed through countrywide public awareness strategies	Mitigation/ Preparedness

Table 3: Hyogo Framework for Actions (2005-2015) Indicators of Resilience to Disasters

④ Reducing underlying risk factors	1) environment related policies incorporate DRR as an integral objective 2) social development policies and plans are implemented to reduce the vulnerability of populations most at risk 3) economic policies are implemented in order to reduce the vulnerability of economic activities 4) planning and management of human settlements specify building codes 5) DRR measures are incorporated into post-disaster recovery processes 6) assessments of disaster risk impacts on major development projects are systematically in place	Mitigation/ Preparedness /Recovery
⑤ Preparedness for effective response and recovery	1) strong institutional and technical capacities for disaster risk management are in place 2) contingency plans are in place at all administrative levels, with regular drills and rehearsals 3) financial reserves are intact for effective support during recovery 4) information exchange channels ready during disasters	Preparedness / Response

Table 3: Hyogo Framework for Actions (2005-2015) Indicators of Resilience to Disasters, cont.

As can be seen in the Table 3, a major portion of the Hyogo Framework concentrates on building long-term resilience through enhanced mitigation and preparedness measures. When delved into the specifics, such measures are divided into criteria including governance, risk

identification, education, managing underlying risks, and preparedness for response.

However there are four common capacity elements that determine the success of the above five categories outlined by the Hyogo Framework of Action as these elements can set the overall framework and directionality[34]. These four elements are: 1) legislature, 2) implementation of an umbrella organization, 3) a data collecting system, and 4) a public distribution mechanism. And for these components to perform to each purpose, the government needs capacity to effectively coordinate the elements via fluent information sharing and active agency collaboration. This chapter will examine the Sri Lankan and Indonesian government's progress pertaining to the Hyogo Framework, as well as analyze based on how well information is shared and how actively collaboration is realized between the four capacity elements (implementation, data collecting, public distributions, legislature). It will also examine the overall legal framework that oversees the management of the government's umbrella organization.

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34 Kurita, Tetsushi et al. "Tsunami public awareness and the disaster management system of Sri Lanka." *Disaster Prevention and Management: An International Journal* 15:1 (2006). pp. 92-110.

4.1 STRUCTURE OF CAPACITY ELEMENTS: SRI LANKA

Ratnasooriya and Samarawickrama write that the government of Sri Lanka went through thorough investigation of long-term efforts towards preparedness of the country to natural emergencies[35]. A committee within the parliament was established to make recommendations to reduce the vulnerability and minimize damage due to future situations. Early warning systems were soon after implemented as well. However, according to these authors, there are concerns regarding transparency, and coordination between major stakeholders. This section will analyze the Sri Lankan government's overall disaster management structure based on common capacity: 1) legislature, 2) implementation of an umbrella organization, 3) a data collecting system and 4) a public distribution mechanism.

4.1.1 Disaster Legislature

In the domestic level, legislative progress have been made as the Disaster Management Act was submitted and the Disaster Management Center (DMC) is now employing permanent staff equipped with

35 Ratnasooriya, Harsha A. R., et al. "Post Tsunami Recovery Process in Sri Lanka." *Journal of Natural Disaster Science* 29:1 (2007). pp. 21-28.

comprehensive facilities[36]. In addition to the establishment of the DMC, this legislature also provides for the "appointment of technical advisory committees; [and] the preparation of disaster management plans.[37]" Furthermore, the Disaster Management Act has required all state agencies to prepare their own disaster management plans; however this process has been delayed due to an absent of approval from the National Council[38].

In short, this legislation provides the legal framework for the umbrella organization required for a government-led post-disaster management and long-term resilience building process. One of the goals that the Sri Lankan government is seeking is a certain degree of regional autonomy in disaster management planning (the DM Act requires that state agencies operate their own management plans); however, due to lack of resources (financial, personnel, etc.) such decentralization is yet to be realized. Macroscopic management and long-term resilience building is even yet to be incorporated into the national level of disaster management policies. This will be further elaborated in later parts of this chapter.

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36 Kurita, Tetsushi et al. "Tsunami public awareness and the disaster management system of Sri Lanka." *Disaster Prevention and Management: An International Journal* 15:1 (2006). pp. 92-110.

37 Sri Lanka Disaster Management Act, No. 13 of 2005. Parliament of the Democratic Socialist Republic of Sri Lanka.

38 Jayawardane, A. K. W. "Disaster mitigation initiatives in Sri Lanka." *Faculty of Engineering, University of Moratuwa, Sri Lanka* (2006).

4.1.2 Control Center

Sri Lanka's nation level control center is the Disaster Management Centre, established by the DM Act of the parliament of Sri Lanka. This organization is meant to oversee, centrally plan, and at the same time take charge of dispersing post-disaster management and long-term resilience building plans at regional levels.

Resources necessary for the government's operation and its various projects come in through diverse channels. The World Bank is funding the Dam Safety and Water Management Project, and the Sri Lankan government is also cooperating with the Netherlands through the Emergency Response and Capacity Development Project that took off in 2010[39]. However, the National Budget Department lacks mechanisms of accounting for all of the diverse investments related to disaster risk reduction. In its place, the DMC is taking initiative but its capacity is limited, being a fairly new organization. Moreover, investments from non-governmental organizations as well as international non-governmental organizations are not effectively reaching local levels[40].

Thus, disaster management and long-term resilience building plans

39 Hyogo National Progress Report 2009-2011.
40 Mitchell, Tom et al. "Assessing Progress on Integrating Disaster Risk Reduction and Climate Change Adaptation in Development Processes." (2010).

in the regional and community has been encouraged through a more communal method: the Jana Saba[41]. This local organization consists of community leaders who convene to discuss and propose development for their villages. However, the capacity of these local pseudo-governments are limited in that they do not receive regular budget allocations from the central government for the purpose of DRR. The 2011-13 Hyogo Progress Report estimates that merely 3% of the local budget is allocated to this organization for DRR. What is more, the financial status of the most vulnerable regions are generally weak, and thus do not have an autonomous capacity to improve its community's resilience.

But at the national level, Sri Lanka as managed to build a domestic multi-sectoral platform for disaster risk management that consists civil society members, national finance institutions, sectoral organizations, and science/academic institutions. This platform is called the National Disaster Management Coordinating Committee (NDMCC), which meets biannually[42]. However, there is a low awareness level on HFA priorities as well as terminology, which slows down its implementation process. Moreover,

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41 Hyogo National Progress Report: 2011-2013.

42 Kurita, Tetsushi et al. "Tsunami public awareness and the disaster management system of Sri Lanka." *Disaster Prevention and Management: An International Journal* 15:1 (2006). pp. 92-110.

there is a generally negative attitude concerning information sharing among institutions, despite the fact that they have membership to the same committee[43]. This further obstructs effective coordination.

4.1.3 Data Collection Mechanism and Institutions

There has been no significant progress in systematic disaster risk assessing as Sri Lanka does not yet have a common hazard risk assessment methodology provided at the national level. For example, risk assessments are neither led by a central agency, nor do they have a common customized format (protocol). Hence, such assessments required in development decisions lack coherency. Hazard profiles, however, been compiled via various universities. Profiled hazards include drought, cyclones, flooding, tsunamis, and landslides. The National Aquatic Resources and Development Agency has also completed a tsunami inundation map for research purposes (although this map does not cover the entire territory of Sri Lanka).

According to the 2011-2013 Progress Report, the DMC has thus started a regular upgrading process for the national database for disaster

43 Bitter, Patrizia. "How the Tsunami Triggered a Change Process in the Education Sector of Sri Lanka: Lessons Learnt for Introducing Disaster Safety Education." *Recovery from the Indian Ocean Tsunami*. Springer Japan. (2015). pp. 451-467.

losses. Nationwide data on disaster relief as well as recovery and rehabilitation are also recorded into this database. In addition, the Ministry of Health has implemented a running database for routinely shriveling infectious and contagious diseases. However, the recorded data is not regularly published, and the records on economic loss and recovery resource distribution were periodical (also lacked systematic mechanism)[44]. Moreover, some of the data originating from regional levels were found unreliable due to ineffective information flow between relevant institutions. It was also found that responsible officers were not properly trained to retrieve and analyze the recorded data.

4.1.4 Public Education and Distribution of Resilience Policies

In collaboration with the Ministry of Environment Secretariat of Climate Change, the Ministry of Disaster Management, and the Disaster Management Committee, Sri Lanka has developed a "one-stop" website concerning adaptation to climate changes. Other websites such as the Disaster Management Committee's official website provide relevant

44 Tschoegl, Liz et al. *An analytical review of selected data sets on natural disasters and impacts*. Brussels, Belgium: Centre for Research on the Epidemiology of Disasters, (2006).

information and data to the public[45]. On the other hand, some challenges remain in building and maintaining modern resource centers due to problems related to the government's recruitment process.

In addition to online information distribution, Sri Lanka also conducts conceptual education on disaster risk resilience, commencing from the secondary school curriculum; the curriculum includes education on natural hazards that are prone to Sri Lanka and first aid education[46]. Publications and teaching material are prepared in several local languages, and distribution of important publications such as brochures are concentrated in vulnerable areas along the coastal borders. However, such educational programs targeted at teenagers were evaluated to be rather passive and lacking activity based learning[47]. DRR is also incorporated in university training, especially in urban planning, engineering, earth and environmental sciences, and geographical studies. The University of Colombo and the University of Peradeniya have also developed a Master's of Science program on Disaster management. The main issue concerning the above professional level programs is the absence of self-assessment

45 Disaster Management Center Official Website, http://www.dmc.gov.lk/index_english.htm.

46 Donga, Mario and Bitter, Patrizia. "Teaching Disaster Risk Management in Sri Lanka's Schools," Deausche Gesellschaft fur Technische Zusammenarbeit (GTZ) GmbH (German Technical Cooperation). (2008).

47 Hyogo National Progress Report: 2009-2011

procedures. And apart from training through educational institutions, Sri Lanka was evaluated to generally lack guidelines, modules, visual advertisements, and manuals targeted towards the public[48]. As a result, the sustainability of knowledge management at the local level has not reached optimal levels as of 2013.

Furthermore, public education campaigns in select vulnerable communities include programs that target enhancing disaster awareness. These programs, however, are held rather sporadically[49]. Management should be improved so that these awareness programs are regularly continued. Other initiatives have been incorporated in order to encourage a widespread culture of disaster resilience. "National Safety Day" has been established on the 26th of December to commemorate victims and stimulate attention[50]. A culture of disaster resilience is also fostered via exhibitions at the community and national levels; these exhibitions aim to transmit messages on disaster resilience. In addition, according to the progress report, local governments are provided with training concerning such public campaigns so that information on risk reduction proceedings

48 Hyogo National Progress Report: 2011-2013.

49 Kurita, Tetsushi et al. "Tsunami public awareness and the disaster management system of Sri Lanka." *Disaster Prevention and Management: An International Journal* 15:1 (2006). pp. 92-110.

50 Ha, Huong, R. et al. *Strategic Disaster Risk Management in Asia*. New Delhi: Springer India. (2015).

are accessible at local levels.

The Hyogo Framework emphasizes that comprehensive contingency planning and regular drills need to be implemented at all administrative levels. Elements of successful contingency plans include a concrete operational and communications center, organized search and rescue teams, steady stocks of emergency relief equipment and temporary shelters[51]. Although the government of Sri Lanka has shown progress in establishing a control center ready with rescue personnel, it lacks relatively in material resources.

In sum, Sri Lanka has a general lack of coordination between the legislative branch and the implementing agencies as the ongoing revisions on the Disaster Management Act as well as the National Disaster Management Plan by the legislature are not effectively transmitted down to implementing agencies[52]. Therefore, while implementing agencies have necessary drills designed and programmed, they have not yet been systematically carried out due to lack of enforcement via law.

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51 Kennedy, Jim, et al. "The meaning of 'build back better': evidence from post-tsunami Aceh and Sri Lanka." *Journal of contingencies and crisis management* 16:1 (2008). pp. 24-36.

52 Hyogo National Progress Report: 2011-2013.

4.2 COORDINATION AMONG CAPACITY ELEMENTS: SRI LANKA

Section 4.1 discussed the four common capacity elements required for a successful implementation of the goals outlined by the Hyogo Framework. However in addition to simple operation of the common capacity elements, appropriate government coordination linking the elements is equally important in enhancing the effectiveness of the resilience building process. Effective coordination can be seen through 1) fluent resources and information sharing among the capacity elements, and 2) active agency collaboration.

4.2.1 Resources and Information Sharing

According to the 2011-2013 Progress Report, information sharing among interrelated agencies is not fluent, and current scientific and economic research facilities lack a follow-up apparatus after preliminary research submissions to funding organizations.

For instance, most undergraduate and post-graduate educational institutions in their natural and applied science departments administer diploma programs that incorporate disaster risk resilience research. Joint research projects on DRR, climate adaptation, and natural disaster modeling are also ongoing with international organizations and foreign

universities. The major constraint assessed by the government of Sri Lanka however, is 1) the lack of monitoring and evaluating mechanisms for the research outcomes and 2) the lack of research in the regional level[53]. Moreover, the findings are rather inaccessible and to the general public as well as agencies responsible for implementation. Due to such lack of communication between research facilities and implementing agencies, financial funding is also rather limited.

Ready information sharing during disasters is also a valuable capacity element. Hence, well coordinated governments require for a nationwide procedure of exchanging information for the purpose of assessing damage levels and minimizing casualties during hazardous events. Currently in Sri Lanka, the Damage and Loss Assessment method has been benchmarked from Latin American practices[54]. This program, which assesses the damage and post-disaster needs by community, has been modified to fit local circumstances. The program has been piloted in Western and Southern provinces of the island. The test runs have uncovered that despite meaningful assessments, the reporting mechanism

53 Hyogo National Progress Report: 2011-2013.

54 Asian Development Bank, Japan Bank for International Cooperation, World Bank. "Sri Lanka 2005 Post-Tsunami Recovery Program: Preliminary Damage and Needs Assessment." (2005).

as well as data maintenance procedures are quite weak[55,56]. In addition, partner organizations tend to be reluctant in sharing the collected information. In sum, while there is a network established to link agencies that assess the damage and agencies that attend to necessary needs, this reluctance to exchange information results in delayed action.

4.2.2 Agency Collaboration

Agency collaboration is coordinated mainly by the National Disaster Management Coordination Committee (NDMCC). According to a the government of Sri Lanka's Disaster Management Centre, the NDMCC (operating under the Inter-Agency Coordination Committee) categorizes all relevant private and public agencies into three categories[57]. This Committee aims to coordinate ministerial level agencies in order to provide policy recommendations to the National Council. It also required to provide personnel and administrative assistance to domestic agencies for the purpose of increasing the efficiency of resilience building activities.

Regional and sub-regional collaboration in risk assessment as well

55 Asian Development Bank, Japan Bank for International Cooperation, World Bank. "Sri Lanka 2005 Post-Tsunami Recovery Program: Preliminary Damage and Needs Assessment." (2005).
56 Hyogo National Progress Report: 2011-2013.
57 Hettiarrachchi, Gamini. "National Disaster Management Coordination Committee." Disaster Management Centre.

as early warning coordination is also roughly in place. Protocols for information sharing are established, and several regional frameworks are established for effective resourcing of personnel and necessary funds and strategies[58]. Sri Lanka is also attempting to coordinate with international institutions such as the UN; it participated in the tsunami early warning drill conducted in the Asian region by the UN since 2011[59]. However, the government of Sri Lanka evaluated that Sri Lanka's participation in South Asian regional cooperation mechanisms were rather weak with more nominal characteristics in its National Progress Report. Moreover, the lack of IT facilities in various government institutions contributed to the difficulties to connect with the global network during peak business hours.

4.3 STRUCTURE OF CAPACITY ELEMENTS: INDONESIA

Indonesia is currently receiving attention for its efforts towards building multi-level arrangements for dealing with major natural disasters. According to Denis Seng, the 2004 tsunami, unlike previous natural disasters that Indonesia has experienced, acted as a trigger for institutional

58 South Asian Association for Regional Cooperation. "Regional Cooperation on Coastal and marine Risk Mitigation Plan for South Asia: Roadmap," SAARC Workshop Paper (2008).

59 Singh, David. "Indian Ocean Tsunami Early Warning Systems Pass Test," News Archive, Regional Office for Asia and Pacific, The United Nations Office for Disaster Risk Reduction (UNISDR AP). (2012).

change and reorganization[60]. Following such a trigger, there have been considerable efforts to deal with natural disasters and risks through multi-level institutional arrangements and governance. Such efforts particularly target tsunamis, and the designed architecture is theoretically expected to assist with building disaster resilience at regional as well as trans-boundary levels. With the above initiatives already in place, the next step challenge that Indonesia now faces is thorough implementation.

Seng further writes that at the moment, the focus of Indonesia's disaster management strategies and relevant government spending is still too tilted towards post-disaster management rather than prevention and preparedness. Nevertheless, anticipated fusion of regional institutional structures such as the Coastal and Small Island Management law (although there are concerns regarding the possibility of commercialization of parts of the coastal zones) and the Disaster Management law is expected to contribute to pre-disaster resilience at the national level[61]. Taking into consideration the above, this section will analyze the Indonesian government's overall disaster management structure based on common

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60 Seng, Denis Stanley Chang. "Tsunami Resilience: Multi-Level Institutional Arrangements, Architectures and System of Governance for Disaster Risk Preparedness in Indonesia." *Environmental Science & Policy* 29 (2013). pp. 57-70.

61 Al Afghani, Mohamad Mova. "Coastal Management Law Review?" *The Jakarta Post*, April 15, 2008.

capacity: 1), legislature, 2) implementation of an umbrella organization, 3) a data collecting system and 4) a public distribution mechanism.

4.3.1 Disaster Legislature and Control Center

While the government of Indonesia has passed many laws and acts regarding disaster management and risk reduction, much of it has not yet reached local (district, city) levels as of 2013[62]. In other words, most of the newly written legislations do not yet have the effects of decentralizing risk management. In general, the National Progress Report assesses that the upmost challenge in carrying out disaster risk reduction at all levels is the lack of understanding of the concept itself. Essential disaster management policies are administered by the central government; however, the respective frameworks are not effectively disseminated regionally[63].

As one of the world's most vulnerable country to natural disasters, the government of Indonesia as greatly emphasized control and post-management of natural disaster risks its National Medium-Term Development Plan (RPJMN 2010-2014). The 2004 Tsunami has acted as a major trigger for change and reorganization of Indonesia's disaster risk

62 Hyogo Progress Report: 2011-2013.
63 UNDP Indonesia. "Lessons Learned: Disaster Management Legal Reform, the Indonesian Experience." (2015).

institutions. The mentioned Development Plan in addition to the Indonesian government's National Action Plan for DRR shows that significant efforts and progress have been made in constructing multi-level institutional arrangements, architectures and governance to deal with natural disasters (especially tsunamis). Although comprehensive implementations of these architectures are currently hindered by 1) procedural difficulties (allocation of funds and resources, etc.) in the local levels and 2) overemphasis on post-disaster management as opposed to pre-disaster capacity building, the multi-level efforts may unfold to be effective in building resilience[64]. Particularly, institutional arrangements such as the Disaster Management Law can act as important variables in enhancing national resilience to tsunami disasters.

This framework provided by RPJMN 2010-2014 also emphasizes capacity building in preparedness of the Indonesian government as well as that of local communities; in particular, scientific research regarding the upgrade of the Tsunami Early Warning (TEW) System and the Weather

64 Tjiptoherijanto, Prijono. "Capacity Management for Disaster Risk Reduction: Lessons Learned from Tsunami in Indonesia," [PowerPoint slides], retrieved from http://unpan1.un.org/intradoc/groups/public/documents/un/unpan030040.pdf. (2008).

Early Warning System is one of its top priorities in addition to disaster recovery action plans[65]. Although a TEW chain reaching from national level to local levels is crucial for disaster early preparedness, currently Indonesia does not yet have an official national warning chain, and is in the process of making[66]. A systems of governance approach also shows that Indonesia is showing a fairly balanced growth in political, economic, and social disaster management capacity. The emergence of active civil associations also is contributing to the network of ongoing efforts.

Moreover, according to RPJMN 2010-2014, the Indonesian government seeks to increase the capacity to overcome natural disasters through (1) capacity building of the government apparatus and of the community in the efforts to mitigate risks and (2) forming the rapid action team for handling natural disasters[67].

Meanwhile, Indonesia's government control center still lacks management capacity on disaster response as well as an understanding in

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65 Ministry of National Development Planning, National Development Planning Agency. "Regulation of the President of the Republic of Indonesia Number 5 of 2010 Regarding the National Medium-Term Development Plan (RPJMN) 2010-2014: Book 1 (National Priorities)," Government of Indonesia. (2010).

66 Seng, Denis Stanley Chang. "Tsunami Resilience: Multi-level Institutional Arrangements, Architectures and System of Governance for Disaster Risk Preparedness in Indonesia." *Environmental Science & Policy* 29 (2013). pp. 57-70.

67 RPJMN 2010-2014. Ministry of National Development Planning. Government of Indonesia.

disaster risk reduction[68]. However, a lack of, despite the importance of, sophisticated urban planning explains Indonesia's slow progress. With rapid urbanization, factors such as risk resilient spatial planning, strategic infrastructure and urban services are in planning, but not yet sufficiently reached the stage of actual implementation. Nevertheless, with the help of the research capacity and funds of international organizations, the Indonesian government is working on building such capacity.

4.3.2 Data Collection Mechanism and Institutions

Risk assessments regarding tsunamis in Indonesia are led by the Agency for Meteorology, Climate and Geophysics. Risks pertaining to floods are assessed primarily by the Ministry of Public Works; likewise, specific leading agencies are assigned to specific natural disasters[69]. The assessments include valuable information on regional vulnerability, community capacity, as well as potential damages so that comprehensive risk map can be drawn. However, the technical capacities of most local disaster management agencies fall behind standards and there is a lack of

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68 Tjiptoherijanto, Prijono. "Capacity Management for Disaster Risk Reduction: Lessons Learned from Tsunami in Indonesia," [PowerPoint slides], retrieved from http://unpan1.un.org/intradoc/groups/public/documents/un/unpan030040.pdf. (2008).

69 Hyogo National Progress Report: 2009-2011.

common methodology among the various local agencies[70]. Financial resources must also be transmitted from the central to the local governments for better outcomes.

Unlike risk assessments, damage assessments are carried out more efficiently in Indonesia. According to the National Progress Reports in 2011-2013, losses due to disasters are systematically update onto the database, monitored and analyzed. In some provinces, the collected data have already been utilized for village planning objectives although this practice is not widespread yet. Improvements are required in terms of coordination among the various local agencies. In particular, coordination (e.g. establishing a common methodology) between risk assessing agencies and damage assessing agencies is desirable so the researches do not produce unnecessary redundancies. Again, challenges exist in terms of budget, technical capacity, and lack of adequate personnel[71].

4.3.3 Public Education and Distribution of Resilience Policies

Indonesia's public information and warning dissemination system

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70 Alexander, Bob, et al. "Sustainable livelihood considerations for disaster risk management: implications for implementation of the government of Indonesia tsunami recovery plan."*Disaster Prevention and Management: An International Journal* 15:1 (2006). pp. 31-50.

71 Hyogo National Progress Report: 2011-2013.

is quite successfully organized at the national level[72]. Information originating from primary data collecting agencies such as the Agency of Meteorology, Climate and Geophysics is effectively processed and proactively delivered to the public via public information broadcasts, and the internet. In addition to national level accomplishments, there also exist local level achievements often initiated by local governments, universities and other non-governmental actors. Nevertheless, the physical problems such as poor internet availability in some secluded areas remain as challenges[73]. The Progress Reports also insinuate that in such remote areas, there also exist cultural barriers as people do not aggressively seek for risk-related information.

Moreover, like Sri Lanka, disaster management strategies are incorporated into the Indonesian education system. Specifically, primary, secondary and university curriculum all include disaster risk reduction learning programs[74]. Due to the commitment of various governmental

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72 Hanka, W., et al. "Real-time earthquake monitoring for tsunami warning in the Indian Ocean and beyond." *Natural Hazards and Earth System Sciences* 10:12 (2010). pp. 2611.

73 Lauterjung, Joern, et al. "The challenge of installing a tsunami early warning system in the vicinity of the Sunda Arc, Indonesia." *Nat. Hazards Earth Syst. Sci* 10:4 (2010). pp. 641-646.

74 Morin, Julie, et al. "'Tsunami-resilient communities' development in Indonesia through educative actions: Lessons from the 26 December 2004 tsunami."*Disaster Prevention and Management: An International Journal* 17:3 (2008). pp. 430-446.

agencies (Ministry of Education and Culture, National Agency for Disaster Management), numerous pilot curricula have been experimented but at the current stage, educational programs are yet to be implemented down to local levels[75].

4.4 COORDINATION AMONG CAPACITY ELEMENTS: INDONESIA

4.4.1 Resources and Information Sharing

While local governments administer their own budgets for disaster risk reduction policies, it was revealed in the Progress Reports that the central government does not allocate budgets for disaster management to local governments on a regular basis. In terms of risk responsibilities, the Indonesian government has a specific legislation (in part of the Disaster Management Act) that mandates local governments to manage their own regions[76]. In other words, governance pertaining to disaster risk is decentralized in the sense that each local government is required to take appropriate responsibility. However, community participation is not yet realized as local governments are still struggling with finalizing necessary

75 Hyogo National Progress Report: 2011-2013.

76 Djalante, Riyanti, et al. "Building resilience to natural hazards in Indonesia: progress and challenges in implementing the Hyogo Framework for Action."*Natural Hazards* 62:3 (2012). pp. 779-803.

legal frameworks[77]. This connects back to the first indicator in that practical decentralization of risk management is not yet reached due to the unclear legal framework that should be provided by the central government.

Moreover, there are further difficulties of administering a decentralized resilience building mechanism as at the local government level, disaster management is yet to become a priority in budget allocation[78]. But in the national level, a great deal of the disaster management programs have started off as being incorporated into pre-existing developmental programs as opposed to having separate budgets and administrative procedures. Therefore, there is less necessity for a rearrangement of central and local government agencies fitted for an exclusive purpose of disaster resilience building programs; hence there is less need for a new system of resource and information allocation as most projects are run by agencies that have prior experience and sufficient resources. In other words, disaster related resilience building projects have been absorbed by pre-existing developmental planning agencies that already possess information sharing channels. And on one hand,

77 Djalante, Riyanti, et al., (2012).
78 Hyogo National Progress Report: 2011-2013.

contingency funds are prepared and shared at the national level as well as in most local administrations[79]. In regards to administering the disaster management programs, the main challenge stems from the fact that personnel resources pertaining to these new resilience building projects are quite new and less experienced, rather than the fact that there is a lack of communication among relevant agencies[80].

4.4.2 Agency Collaboration

As of 2008, the Indonesian Platform for DRR has been created to facilitate inter-agency collaboration. This multi-stakeholder platform incorporates the government, the private sector, members of the civil society and other non-governmental bodies. However, this platform has not been operating systematically; it has not been receiving regular budgets, and mostly private companies have taken financial responsibility when it is visible. In order for this multi-sectoral platform to have equal influence and say in disaster management strategies as the government, more work

79 Global Facility for Disaster Reduction and Recovery. "Indonesia: Advancing a National Disaster Risk Financing Strategy - Options for Consideration," The International Bank for Reconstruction and Development, The World Bank. (2011).

80 Djalante, Riyanti, et al. "Building resilience to natural hazards in Indonesia: progress and challenges in implementing the Hyogo Framework for Action."*Natural Hazards* 62:3 (2012). pp. 779-803.

regarding publicity of the organization is needed[81]. Moreover, meetings among the various sectors (private, public) must be regularly scheduled for increased influence.

In regional agency collaboration efforts, Indonesia has taken a leading role in implementing the Indian Ocean Tsunami Warning System (IOTWS). The IOTWS members are all ASEAN countries in addition to several other nationals in the Pacific region; it aims to tackle trans-boundary risks in relation to tsunamis. Apart from the IOTWS, Indonesia also has a leading role in the ASEAN Coordinating Center for Humanitarian Assistance on Disaster Management (AHA Center)[82]. Meanwhile, the main challenge in fully appropriating the benefits of trans-border cooperation remain to be trans-border information sharing. Moreover, among the participatory countries, there is a general lack of awareness on the importance of regional arrangements for disaster management. In this respect, more joint projects need to be planned and administered in order to facilitate information flow and enhance awareness.

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81 Djalante, Riyanti. "Adaptive governance and resilience: the role of multi-stakeholder platforms in disaster risk reduction." (2012).

82 Lai, Allen Yuhung, et al. "A proposed ASEAN disaster response, training and logistic centre enhancing regional governance in disaster management."*Transition Studies Review* 16:2 (2009). pp. 299-315.

4.5 VARIATIONS

4.5.1 Sri Lanka's Overall Government Competence

Sri Lanka's tax administration has been weakened by the existence of the separatist militant group (LTTE)[83]. Furthermore, the quality of public administration has been dropping over the past decades due to numerous issues including political patronage, overstaffing, and severe salary compression. The government's implementation capacity, particularly at the local level is also substantially overstretched by reconstruction activities related to the tsunami.

Similarly according to the National Progress Reports, the government of Sri Lanka shows particular weakness in the public financial sector[84]. In short, this government's financial structure lacks capacity to deal with large natural disasters. First of all, there is no calamity fund established at the national level. Instead of operating a calamity fund, the current practice is so that the government file requests to various UN agencies for sporadic donations and assistance in the case that a severe

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83 Shaw, Judith and Mulligan, Martin, et al. "Lessons from Tsunami Recovery in Sri Lanka and India: Community, Livelihoods, Tourism and Housing." Monash University, RMIT University. (2012).

84 Koria, Mikko. "Managing for innovation in large and complex recovery programmes: Tsunami lessons from Sri Lanka." *International Journal of Project Management* 27:2 (2009). pp. 123-130.

natural disaster occurs[85]. While the government does provide financial relief assistance for families below a certain income level, the lack of financial capacity results in a considerable portion of eligible families left out. Secondly, the Progress Report insinuates that there is no independent government agency dedicated to dealing with financial arrangements pertaining to disaster recovery and management. Without such proper financially supporting institutions, the disaster risk management program may be quite unsustainable in the long run[86].

4.5.2 Varying Extent of Incorporation of Disaster Management Strategies in National Social and Economic Development Planning

One crucial element of long-term disaster resilience building involves reducing underlying risk factors through measure beyond recovery and reconstruction. Most effectively, risk factors can be eliminated or reduced when disaster management strategies are incorporated into national development planning (social security, economic growth, etc.).

In the case of post-2004 Indonesia, the country has changed status

85 Hyogo National Progress Report: 2013-2015.
86 Hyogo National Progress Report: 2013-2015.

to middle-income country from low-income, which indicates that its development plans in tandem with post-disaster recovery process are yielding tangible results. National level development programs (led by the RPJMN 2010-2014) that aim for food security, social security, and disabled/senior citizens support have been introduced as part of an effort to reduce the general population's vulnerability to severe natural disasters. Economically, the Ministry of Finance had piloted an incentive program for private businesses that fuse disaster risk reduction initiatives in their regular profit-making activities[87].

On the other hand in Sri Lanka, diverse programs exist to increase the social resilience of the vulnerable population to natural disasters. Such programs include property insurance (crop insurance), (un)conditional cash transfers, provisional employment plans, and micro financing[88]. Crop insurance plans have been introduced by the Ministry of Agriculture via cooperation of the Sanasa Bank and the Agriculture Insurance Board. Other property insurance plans have also been schemed by the National Council

87 Hyogo National Progress Report: 2011-2013.

88 Esham, Mohamed, and Garforth, Chris. "Agricultural adaptation to climate change: insights from a farming community in Sri Lanka." *Mitigation and Adaptation Strategies for Global Change* 18:5 (2013). pp. 535-549.

for Disaster management as well as private insurance companies[89].

These insurance plans however, are not in effect and thus do not produce tangible benefits to the targeted population. The main reason for this is the gap between the economic capacities of the targeted families and the financial requirements for the insurance schemes. In other words, such insurance plans are not appealing to the most needed families as the plans require regular financial contributions beyond their earning capabilities. Moreover, information regarding such social safety net plans is not adequately made available to needed communities due to lack of information sharing between the central and local government agencies[90].

Managing human settlement is also a key factor verifying determining whether or not there are investments dedicated to reducing vulnerabilities in urban settlements. In other words, for long-term resilience, disaster risk reduction strategies need to be incorporated into macroscopic development plans via initial stages of planning and managing human settlements. Examples include sophisticated drainage systems (in the case of areas prone to flooding), landslide stabilization facilities, and regulation of private real estate development in risk sensitive regions all in

89 Arun, Thankom, et al. "Bequest motives and determinants of micro life insurance in Sri Lanka." *World Development* 40:8 (2012). pp. 1700-1711.

90 Hyogo National Progress Report: 2011-2013.

the process of reconstruction.

The government of Sri Lanka has been successful in developing construction codes and guidelines pertaining to disaster (tsunami, flooding, seasonal cyclones) prone regions[91]. Led by the Technical Advisory Committee, templates for safer school and hospital buildings have been finalized for review by the Ministry of Education and Health. But despite such guidelines set by the above agencies, illegal construction activities persist in vulnerable areas as well as in urban settlements. Weak enforcement of the respective regulations and construction guidelines result from inadequate coordination with monitoring agencies.

4.5.3 Early Warning Systems: Differences of Sri Lanka and Indonesia

Perhaps due to its slower progress in terms of incorporating resilience building practices into a broader national development plans, Sri Lanka's early warning systems are relatively quite sophisticated. Approximately 70 warning towers are equipped with vocal warning

91 Tsunami Disaster Housing Program, "Guidelines for Housing Development in Coastal Sri Lanka: Statutory Requirements and Best-Practice Guide to Settlement Planning, Housing Design and Service Provision with Special Emphasis on Disaster Preparedness," National Housing Development Authority, Ministry of Housing and Construction.

systems and satellite communication are installed along the most vulnerable coastal borders[92]. Local level preparedness can be seen through routine monitors and drills. Early warning via the Department of Meteorology and Armed Forces are in effect 24/7, and communication routes are supported through the police communications system as well as mobile message broadcastings[93]. However, financial constraints are visible; due to the high maintenance and operational costs, the sustainability of such early warning and supporting systems above are in question. Moreover, the traumatic experiences of some communities result in panic and over-reaction to regular early warning messages.

In the case of Indonesia, early warning systems are operating in vulnerable areas so that such regions receive timely and clear warnings in the case of imminent natural hazards. Such early warning systems have been implemented separately for different types of natural disasters (tsunamis, floods, forest fires, seasonal cyclones, etc.). But despite considerable levels of availability, utilization of the system is quite limited

92 Hyogo National Progress Report: 2011-2013.

93 Sri Lankan Ministry of Finance and Planning. Post-Tsunami Recovery and Reconstruction. Prepared by the Ministry of Finance and Planning and the Reconstruction & Development Agency (RADA) in consultation with Development Partners, Representative of the INGOs & NGOs, Private Sector and the Civil Society. (2006).

due to lack of capacity at local administration level[94]. For example, some communities lack facilities to deliver early warnings to individual households. Maintenance of the equipment also needs improvement.

Overall, Sri Lanka's performance in establishing a well-maintained and penetrating early warning system is comparably sophisticated when taking into account the government's lack of resilience building policies incorporated into macroscopic development plans such as social and economic development policies and human settlement management. Such concentration of resources and capacity into the early warning system seems to be in compensation for its slow progress in long-term resilience building strategies.

4.5.4 Implications of Variations

Overall, Sri Lanka's weak public financial sector (which heavily contributes to the country's general weak government competence and coordination ability) has led to a lack of macroscopic policies that incorporate disaster management into national social and economic development plans. Instead, it has focused its somewhat limited resources in constructing a reliable and widely accepted early warning system. In

94 Hyogo National Progress Report: 2011-2013.

contrast, Indonesia has taken advantage of experienced comparable success in coupling disaster resilience building with national development programs. In short, the main divergence of the two countries' long-term natural disaster resilience building processes can be understood via each country's focus (Indonesia's macroscopic development plan, and Sri Lanka's intensive implementation of the early warning system) which can be explained through the government coordination factor.

5 CONCLUSION

This thesis attempted to provide an answer to why post-tsunami Sri Lanka and Indonesia have been exhibiting diverging progress in building resilience to severe natural disasters. Under the hypothesis that the government capacity to carry out such a process is dependent on its ability to well-coordinate diverse sectors via an effective control center, short-term resilience and long-term resilience were examined separately.

Short-term resilience is indicative of elastic recovery; in other words short-term resilience capacity points to how effective pre-disaster conditions are restored. In this thesis, long-term resilience building was referred to how pre-disaster conditions are not only restored, but improved; this required the integration of disaster management policies into the damaged country's national social and economic development plans.

Hence, two separate conclusions were reached each for the influence of government capacity in short-term recovery as well as long-term resilience building. First, the cases of Sri Lanka and Indonesia showed insignificant differences in the short-term reconstruction process. In both cases, inept coordination among key domestic institutions was adequately

overcome through international relief aid. For example, Sri Lanka's Reconstruction and Development Agency (RADA), although established in the reconstruction stage to reduce future vulnerability to natural disasters by improving physical infrastructure, failed to deliver appropriate levels of performance due to poor collaboration with local agencies. In its place, international humanitarian agencies (despite some inefficiencies mentioned previous chapters) played an irreplaceable role, as their reconstruction aid, grants, and material supply contributed majorly to Sri Lanka's first stage recovery process. In other words, rudimentary levels of re-building and livelihood restoration were made possible via international aid.

The situation in Indonesia was not different. Originally, the nationwide reconstruction process was to be coordinated by two governmental agencies, the National Development Planning Agency (BAPPENAS) and the Ministry of Public Works. However, like the case in Sri Lanka, the main complaint was that central government-led rebuilding initiatives failed to take into consideration the specific local demands. As a result, a considerable portion of the tangible achievements were made by international NGOs and foreign aid. The diverging outcomes of the two civil conflicts also showed that international acted as overriding factors of weak

government capacity to achieve restoration.

In the long-term resilience building strategies however, strong government coordinating leadership was found as a decisive factor for progress. In other words, weak capacity based on ineffective government coordination can hinder progress in disaster management policies that are required to enhance durability to severe natural disasters. Specifically, the capacity elements (elements of the government structure needed for systematic capacity building: legislature, control center, data collecting agencies, public education and policy distribution) were compared for the two country cases. And as a result, at the moment, Sri Lanka and Indonesia have contrasting levels of progress in long-term resilience building strategies. In Indonesia, the government (via the RPJMN 2010-2014) has taken the approach of slowly fusing disaster management strategies into existing national development plans, which requires an already established level of efficient government capacity. Accordingly, the newly introduced disaster related polices were able to take advantage of the pre-existing network of domestic agencies. Hence, information sharing among the capacity elements was comparably fluent.

In the case of Sri Lanka, information sharing and collaboration between the national and district/community levels were especially weak.

Thus, better allocation of responsibilities between levels of government was found to be necessary. But more importantly, lack of funds for economic and urban planning measures, poor communication in general within the society, weak leadership, and poor institutional arrangement all contributed to a general lack of capacity to incorporate disaster management strategies into the country's development plans. To be specific, the above obstacles led to poor agency coordination between the capacity elements. And because disaster management and national development strategies have not been able to be integrated, establishing improved long-term resilience is showing less progress in comparison to Indonesia.

In conclusion, insufficient government capacity to deal with ongoing natural disasters in the short-term can be compensated through excessive aid from international institutions and NGOs. However in the long-term, government capacity is required to appropriately coordinate disaster resilience building strategies in tandem with long-term development plans, a process which requires high government performance indicated by active information sharing and inter-agency collaboration.

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국문 초록
Abstract in Korean

정부 역량 강화와 자연재해 복원력의 관계에 대한 연구: 인도네시아와 스리랑카 사례 비교분석

본 논문은 2004 년 인도양 쓰나미 이후 인도네시아와 스리랑카의 재난 관리 및 국내 복원력 증진 전략을 살펴본다. 피해 규모와 단기 복구 진행 과정이 유사함에도 불구하고 이 두 국가는 장기적 재해 복원력 구축에 있어서 차이점을 보인다. 따라서 이 논문은 각 정부의 부처 기획 및 조정 능력에 초점을 맞춘 역량 강화가 국가의 단기, 장기적 자연재해 복원력에 미치는 영향에 대해 조사한다. 기획 및 조정 능력은 각 부처간 정보의 공유, 그리고 협력의 정도를 평가하여 종합적 결론을 내렸다.

연구 결과, 자연재해 직후 활발히 이루어지는 국제 구호 활동으로 인해 단기적으로는 정부 역량의 부족이 복구 과정에 많은 영향을 미치지는 않지만, 장기적 관점에서의 복원력은 정부의 역량이 개발 계획은 필수적인 요소로 나타났다. 인도네시아와 스리랑카는 특히 장기적 자연재해 복원력의 수준에서 차이를 보였다. 인도네시아는 기존의 국가 발전 계획에 재난 관리 전략을 융합하여 진행하는 반면, 스리랑카는 제도적 장치의 부족함으로 인해 동일한 수준의 복원력 증진 전략이 부재했다.

주요어: 자연 재해, 복원력, 2004 쓰나미

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